



Evaluation #

200601-W  
(Replaces 200025-W)

Safety & Buildings Division  
201 West Washington Avenue  
P.O. Box 2658  
Madison, WI 53701-2658

## Wisconsin Building Products Evaluation

Material

SpaceJoist Webs

Manufacturer

Truswal Systems Corporation  
1101 North Great Southwest Parkway  
Arlington, Texas 76011

### SCOPE OF EVALUATION

**GENERAL:** This report evaluates SpaceJoist parallel chord wood trusses with metal webs, manufactured by Truswal Systems Corporation, for use as structural framing lumber (engineered and the fire-resistive design requirements).

**Comm** requirements below in accordance with the current **Wisconsin Uniform Dwelling Code for 1- & 2- family dwellings:**

- **Structural:** The SpaceJoist parallel chord wood trusses with metal webs were evaluated for use in dry locations, limited to floor and roof joists in accordance with **ss. Comm 21.02 (3)(a)** and **Comm 21.19**.
- **Metal Connector Plates:** The metal connector plates have been evaluated for use with the allowable design values (see Product Approval Number 200437-N), in accordance with **s. COMM 21.02 (3)** and **s. COMM 20.24-12**.

The **IBC** requirements below in accordance with the current **Wisconsin Amended ICC Code:**

- **Structural:** The SpaceJoist parallel chord wood trusses with metal webs were evaluated for use in dry locations, limited to floor and roof joists (in Type V construction), in accordance with **ss. IBC 2301.2, 2301.2.1, 2303.1, 2303.1.2, and 2306.1**.
- **Fire-Resistive Assembly:** SpaceJoist parallel chord wood trusses with metal webs were evaluated for use as a component of a one-hour fire-resistive rated assembly in accordance with **ss. IBC 702.1, 703.1, 703.2, 703.3, 710.1 and Table 719.1(3), Item 21-1.1** (also see **s. IBC 708.4**).
- **Metal Connector Plates:** The metal connector plates have been evaluated for use with the allowable design values (see Product Approval Number 200437-N), in accordance with **s. IBC 2303.4** and **s. IBC Chapter 35**.

### DESCRIPTION AND USE

The SpaceJoist truss system with metal webs is assembled with Truswal metal plate connectors and “V”-shaped metal webs, also manufactured by Truswal Systems Corporation.

The SpaceJoist truss system with metal webs is an engineered composite wood and steel plate structural truss used for floors and flat roofs used in residential and light commercial construction. SpaceJoists are parallel chord trusses constructed with 2-inch by 3-inch or 4-inch Douglas Fir-Larch, Southern Pine, Hem-Fir, or Spruce Pine Fir chords positioned flat or on edge as shown in Figures Nos. 1 and 2. The webs installed in pairs, are “V”-shaped sections with a 24-inch or 28-inch truss panel length and are cold formed from ASTM A653 Grade 37 structural quality galvanized steel sheet with teeth formed integrally at the top and bottom extremities of the “V”. The teeth of the “V”-shaped metal webs are embedded into both sides of the top and bottom wood chords. The 20-gauge metal webs are manufactured in five different depths and identified as 8V20, 9V20, 10V20, 12V20 and 16V20.

### **TESTS AND RESULTS**

Test data for the TW-16 and TW-20 metal connector plates can be found in the LIMITATIONS section of Approval Number 200437-N.

The maximum axial forces for a pair of SpaceJoist web members are:

<b>TENSION</b>		
<b>WEB SIZE</b>	<b>LUMBER SPECIES</b>	<b>ALLOWABLE WEB DESIGN LOAD, LBS.</b>
<b>8V20</b>	So. Pine	1718
	Douglas Fir	1718
	Hem-Fir	1293
	Spruce-Pine-Fir	1244
<b>9V20</b>	So. Pine	1789
	Douglas Fir	1789
	Hem-Fir	1323
	Spruce-Pine-Fir	1318
<b>12V20</b>	So. Pine	1733
	Douglas Fir	1733
	Hem-Fir	1258
	Spruce-Pine-Fir	1311
<b>10V20</b>	So. Pine	1665
	Douglas Fir	1665
	Hem-Fir	1224
	Spruce-Pine-Fir	1318
<b>16V20</b>	So. Pine	1766
	Douglas Fir	1766
	Hem-Fir	1286
	Spruce-Pine-Fir	1324

<b>COMPRESSION</b>	
<b>WEB SIZE</b>	<b>ALLOWABLE WEB DESIGN LOAD, Lbs.</b>
8V20	2206
9V20	2104
10V20	2088
12V20	2578
16V20	2334

SpaceJoist truss system with metal webs Design Manual is on file with the department. The Design Manual has details, SpaceJoist types and roof and floor loading span tables signed and sealed by a P.E. (Wisconsin).

### **LIMITATIONS OF APPROVAL**

The SpaceJoist lumber grade must be determined by the design load requirements of **ss. IBC 1603, 1604.2 and 1604.3, ss. Comm 21.02 (3)(a) and Comm 21.19.**

SpaceJoist parallel chord wood trusses with metal webs shall be designed for appropriate loads and deflection limitations based upon the **Wisconsin Uniform Dwelling Code for 1 & 2 family dwellings** and the **Wisconsin**

**Amended ICC Code.** The cumulative effects of short-term loads, such as snow, shall be considered in determining the duration of load. For snow load, no greater duration of load factor than 1.15 shall be used.

The **IBC** limitations below are in accordance with the current **Wisconsin Amended ICC Code**:

- **Structural:** The SpaceJoist parallel chord wood trusses with metal webs described in this evaluation report comply with the codes listed under the **SCOPE OF EVALUATION** section of this report, subject to the following conditions:
  1. The SpaceJoist truss system with metal webs shall be designed in accordance with this report. Details provided in Figures 1 through 7 of this report must be confirmed for applicability for each project, as required by the building official. Engineering calculations may be required. The following items should be considered when submitting calculations to the building official: lateral support, vertical support, connections (including selection of joist hangers), lateral force resistance, applied loads and spans.
  2. Deflections are limited as set forth in the applicable code.
  3. The SpaceJoist truss system with metal webs must be installed in accordance with this evaluation report and the manufacturer's installation details. Installation details may require supplementary considerations. Descriptive literature indicating joist composition, dimensions, installation details including locations and details of blocking, bridging, and this evaluation report must be furnished upon request to code authorities having jurisdiction.

Floor and roof load tables may be used without submittal of calculations provided that the following information is shown on the plans submitted for each project:

- Building product evaluation number **200601-W**, product designation, spans, spacing, loading conditions, bearing details, and other information when required by **ss. Comm 20.18 or 61.50** of the current **UDC** and **Wisconsin Commercial Code**, respectively.
- Span and load tables are based on simple and multiple spans uniformly distributed load conditions for both floors and roofs. Any variation will require submittal of calculations without the use of the load tables for that portion of the project when required by **ss. Comm 20.18 or 61.50**. Further, applications not covered by this building product evaluation report and requiring special consideration may be handled by contacting Truswal Systems Corporation Technical Support Services staff for guidance.
- The SpaceJoist truss system with metal webs is manufactured under an approved quality control program with inspections by any quality control agency accredited by ICBO Evaluation Service, Inc.
- When the design of the SpaceJoist truss system with metal webs assumes composite action, the floor system shall be installed as described in **NER-108** for **Sturd-I-Floor** or **APA-rated** sheathing for field glued panels.
- The SpaceJoist truss system with metal webs are not approved for use where hourly rated construction is required by the Wisconsin Building Codes, unless part of a listed assembly.
  - Where a one-hour fire-resistance rating is required, construction shall comply with Figure 8 of this report, and **ss. IBC 702.1, 703.1, 703.2, 703.3, 710.1** and **Table 719.1(3), Item 21-1.1**.

The various SpaceJoist end conditions are indicated in Figures Nos. 3 and 5. A sufficient bearing area must be maintained so as not to allow the wood compression stress perpendicular to grain to exceed that allowed for the species and grade of material used. In no case shall the bearing width be less than 1.5 inches.

The top flange must be laterally supported at least every 24 inches. The ends of the joists must be restrained to prevent rollover. This is normally provided by the diaphragm sheathing attached to the top flange and to an end wall or a shear transfer panel capable of transferring a minimum force of 50 pounds per foot.

Blocking or X-bracing with equivalent strength may be used. Unless specifically indicated, all truss plates are Truswal Model 20. An opening at mid-span is permitted as indicated in Figures Nos. 4 and 6, which is compatible with the 24-inch or 28-inch panel lengths.

The webs are installed in pairs on opposite faces of the chord members and the contact area must be free of knots. The fabrication tolerances and chord splice locations are as indicated in Figures No. 1 and No. 2. Each chord may have one splice joint located within the middle half of the respective panel.

The minimum connector plate centered over the splice joint shall be a Truswal 2.5-inch by 6-inch Model 20. The required connector plate size shall be specified on an engineered truss drawing.

This approval is based on simple span uniformly distributed loads only. Any variation will require submittal of calculations for the project.

**One-Hour Fire-Resistive Floor-Ceiling or Roof-Ceiling Assemblies:**

- **Trusses:** Wood trusses are parallel-chord trusses having an overall minimum depth of 12 inches (305 mm). Trusses are spaced a maximum of 24 inches (610 mm) on center.
- **Strongback Bracing:** Bracing must be minimum 2-by-6 grade-marked lumber oriented vertically, and must be installed perpendicular to trusses on maximum 10-foot (3048 mm) centers. Braces are attached to each truss with a minimum of three 10d nails.
- **Roof-Floor Sheathing:** Floor or roof sheathing shall be minimum 19/32-inch-thick (15.1 mm) tongue-and-groove plywood. Long edges are installed perpendicular to trusses. Plywood sheathing is attached in accordance with **s. IBC 2304.9.1, item 31**.
- **Ceiling Membrane:** Two layers of ½-inch-thick (12.7 mm) USG Gold Bond Fire Shield® Type X wallboard are applied directly to the bottom chord members of the wood truss. The base ply is applied perpendicular to the trusses and is attached to the wood chord members with 1-1/4-inch-long (31.8 mm), Type S drywall screws or 1-7/8-inch-long (47.6 mm), 6d cooler or box nails, spaced 24 inches (610 mm) on center. The face ply is also applied perpendicular to the trusses with side and butt joints staggered 24 inches (610 mm) from the joints of the base ply. The face ply is attached to the bottom chord members with 1-7/8-inch-long (47.6 mm), Type S drywall screws spaced 12 inches (305 mm) on center, or 2-3/8-inch (60.3 mm), 8d cooler or box nails spaced 7 inches (178 mm) on center. Additionally, 1-1/2-inch-long (38.1 mm), Type G drywall screws are installed 3 inches (76.2 mm) from the face ply butt joints and are spaced 12 inches (305 mm) on center. Face layer joints and screws or nailheads are covered with joint compound and are taped.
- **Trusses:** Wood trusses are labeled Truswal SpaceJoists®, and must comply with evaluation report ER-3687. Overall minimum truss depth is 10 ¾ inches (273 mm). SpaceJoist trusses are spaced a maximum of 24 inches (610 mm) on center. SpaceJoist trusses must have SpaceJoist metal webs having minimum 5/16-inch-long (8 mm) teeth. The continuous portion of the metal web member of the SpaceJoists must be located at the bottom chord, and the break in the web member must be located at the top chord. Splices in the bottom wood chord member are permitted provided they occur outside the middle third of the trusses span. See ER-3687 for details of the Truswal SpaceJoist.

This fire-resistive assembly using Truswal SpaceJoists requires a factory-installed TrusGuard™, a No. 30 gage [0.013 inch (0.33 mm)] steel channel, attached along the entire length of the bottom wood chord member of the truss. The TrusGuard is attached to the bottom chord with metal connector plates pressed through the sides of the steel channel. Splices in the TrusGuard must occur at metal connector plate locations and must be lapped a minimum of 6 inches (305 mm).

- **Roof-Floor Sheathing:** Floor or roof sheathing shall be minimum 23/32-inch-thick (18.2 mm) tongue – and-groove plywood with exterior glue. Long edges are installed perpendicular to trusses, and end joists are staggered a minimum of 4 feet (1219 mm). Plywood sheathing is attached with minimum 6d ring-shanked nails with spacing in accordance with **s. IBC 2304.9.1, item 31**. A 3/8-inch (9.5 mm) bead of AFG-01 adhesive is applied to the top chord of the trusses and in the plywood grooves before installation of sheathing.

A single layer of minimum 23/32-inch-thick (18.2 mm) tongue-and groove structural wood-based sheathing underlayment, having a minimum floor span rating of 24 inches (610 mm), may be used as an alternate to the plywood sheathing.

- **Lightweight Concrete Floor Topping (Optional):** Optional perlite or vermiculite aggregate or gypsum concrete may be placed on top of the wood sheathing without affecting the fire-resistive rating. Minimum thickness of the concrete fill is ¾-inch (19 mm). A plastic or paper vapor retarder should be placed on the wood sheathing before placement of the concrete.

Forta-Fill (ER-4147) and Gyp-Crete (ER-3433) may be placed on the flooring without affecting the fire-resistive rating, provided the topping is installed in accordance with its evaluation report.

- **Strongback Bracing:** Bracing must be minimum 2-by-6 grade-marked lumber oriented vertically, and must be installed perpendicular to trusses on maximum 10-foot (3048 mm) centers. Braces are attached to each truss with a minimum of three 10d nails.
- **Ceiling Membrane:** One layer of 5/8-inch-thick (15.9 mm), USG, Type C wallboard is applied directly to the bottom chord members of the wood truss. All joints must be blocked with minimum 3-1/2-inch-wide (89 mm) steel channels or wood members. All wallboard edges are attached to the wood chord members or blocking with 1-5/8-inch-long (41.3 mm), Type S drywall, spaced 8 inches (203 mm) on center. Wallboard joints and screws are covered with joint compound and are taped.

## **IDENTIFICATION**

The webs are identified by a stamping of the letter “T” superimposed on the letter “W”. The trusses are identified by a stamp indicating the manufacturer’s name and **COMMERCE** Product Approval number **200601-W**, the name of the fabricator and the name of the quality control inspection agency.

<p><b>TRUSWAL</b> Systems Logo</p> <p><b>COMM Approval</b> <b>#200601-W</b></p>	<p>(Name and location of truss fabricator)</p>	<p>Name of inspection Agency</p> <p>Conforms to TPI QST - 85</p>
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**FIGURE NO. 8-TYPICAL TRUSS IDENTIFICATION STAMP OR LABEL**

This approval will be valid through December 31, 2011, unless manufacturing modifications are made to the product or a re-examination is deemed necessary by the department. The product approval is applicable to projects approved under the current edition of the applicable codes. This approval may be void for project approvals made under future applicable editions. The Wisconsin Building Product Evaluation number must be provided when plans that include this product are submitted for review.

## **DISCLAIMER**

The department is in no way endorsing or advertising this product. This approval addresses only the specified applications for the product and does not waive any code requirement not specified in this document.

Revision Date:

Approval Date: February 27, 2006 By: \_\_\_\_\_

Lee E. Finley, Jr.  
Product & Material Review  
Integrated Services Bureau